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TUMOR DETECTION IN BRAIN USING GENETIC ALGORITHM

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Abstract

Detection of brain tumour is very common fatality in current scenario of health care society. Image segmentation is used to extract the abnormal tumour portion in brain. Brain tumor is an abnormal mass of tissue in which cells grow and multiply uncontrollably, apparently unregulated by mechanisms that control cells. Several techniques have been developed for detection of tumor in brain. Our main concentration is on the techniques which use image segmentation to detect brain tumor. Tumor classification and segmentation from brain computed tomography image data is an important but time consuming task performed by medical experts.

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INTRODUCTION -Segmentation of medical images is challenging due to poor image contrast and artifacts that result in missing or diffuse tissue boundaries. We present a discrete wavelet based genetic algorithm is proposed to detect the MR brain Images. First, MR images are enhanced using discrete wavelet descriptor, and then genetic

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algorithm is applied to detect the tumor pixels. A genetic algorithm is then used in order to determine the best combination of information extracted by the selected criterion. The present approach uses k-Means unsupervised clustering methods into Genetic Algorithms for guiding this last Evolutionary Algorithm in his search for finding the optimal or sub-optimal data partition (Harris and Buxton 1996, Kim et al 2000, Li Zhijun et al 2006) task that as we know, and requires a non-trivial search because of its intrinsic NP-complete nature. To solve this task, the appropriate genetic coding is also discussed since this is a key aspect in the implementation. Our purpose is to demonstrate the efficiency of Genetic Algorithms to automatic and unsupervised image segmentation. Some examples in human MRI brain tumor segmentation are presented and overall results discussed.

Medical imaging is performed in various modalities, such as magnetic resonance imaging (MRI), computed tomography (CT), ultrasound etc. Segmentation is typically performed manually by expert physicians as a part of treatment planning and diagnosis. Due to the increasing amount of available data and the complexity of features of interest, it is becoming essential to develop automated segmentation methods to assist and speed-up image-understanding tasks.

1.1.1 Related Work

Image segmentation is a low-level image processing task that aims at partitioning an image into homogeneous regions. How region homogeneity is defined depends on the application. A great number of segmentation methods are available in the literature to segment images according to various criteria such as grey level, color, or texture (Gonzales and woods 2002). Several automated methods have been developed to process the acquired images and identify features of interest, including intensity-based methods, region-growing methods and deformable contour models. Intensity-based methods identify local features such as edges and texture in order to extract regions of interest. Region-growing methods start from a seed-point on the image and perform the segmentation task by clustering neighborhood pixels using a similarity criterion. Recently, researchers have investigated the application of genetic algorithms into the image segmentation problem (Nordin and Banzhaf 1996, Peng-Yeng 1999 and Ou et al 2004).

To improve the image quality we can use any one of the filtering technique (Mostafa et al 2001). Magnetic Resonance (MR) image enhancement are mainly used for reconstruction of missing or corrupted parts of MR images, image de-noising and image resolution enhancement. While using Magnetic Resonance (MR) images resolution enhancement face many problems like Resolution enhancement of MR images (512 x 512 pixels 2 times more),conservation of sharp edges in the image and conservation and highlighting of details. There are two designed and tested methods used for image resolution enhancement: Discrete Fourier Transform (DFT) and Discrete Wavelet Transform (DWT). Recently wavelets have been successfully used in a large number of biomedical applications (Mostafa et al 2001 and Bealy 1992). The multi-resolution framework makes wavelets into very powerful compression and filter tool and the time and frequency localization of wavelets makes it into a powerful tool for feature detection. This chapter, 2D discrete wavelet transform is used for removing noise from MRI brain image. The performance of an Image Denoising System using Discrete Wavelet Transform (DWT) is experimentally analyzed for four levels of DWT decomposition.